Pituitary abscesses

Report of seven cases and review of the literature

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Seven cases of pituitary abscess are presented and the relevant world literature is reviewed. An enlarged sella co-existing with bacterial meningitis, or bacterial meningitis coinciding with a known or suspected pituitary tumor should suggest the diagnosis of pituitary abscess. Visual field defects should evoke similar suspicion when present in a patient with meningitis. This reasoning enabled us to make the first reported preoperative diagnosis of pituitary abscess. Therefore, in the management of purulent meningitis, we recommend the following: first, skull films are mandatory; second, if the sella turcica is abnormal, the correct presumptive diagnosis is pituitary abscess; and third, if prompt improvement does not follow appropriate antibiotic therapy, the suspected abscess should be explored and drained via the transsphenoidal approach.

KEY WORDS • pituitary abscess • brain abscess • pituitary tumor • infection

ALTHOUGH 50 cases of intrasellar abscess have been reported, none was diagnosed either preoperatively, or, in cases without operation, before autopsy. Recent experience prompted us to review seven cases of pituitary abscess seen during the last 10 years at the University of California School of Medicine, San Francisco (UCSF). Brief case summaries are followed by a discussion of the literature.

Case Reports

Case 1

This 26-year-old woman was admitted to another hospital during April, 1972, with a 1-year history of bifrontal headaches. Evaluation revealed bitemporal hemianopia, and plain skull films showed erosion of the anterior clinoids with straightening of the dorum sellae. Arteriography showed bilateral elevation of the carotid siphons.

The patient was referred to UCSF on June 6, 1972. Results of the admitting ophthalmological examination, pertinent laboratory work, endocrine status, preoperative diagnosis, and follow-up studies are summarized in Table 1 for this patient and all succeeding cases.

On June 23, 1972, a right frontal craniotomy was performed. A tanish fibrous mass was seen elevating the right optic nerve. Aspiration of this mass with a No. 25 needle failed to produce fluid. When the needle was removed, creamy yellow pus-like material exuded from a cystic cavity in the mass. Gram
<table>
<thead>
<tr>
<th>Case No.</th>
<th>Age, Sex</th>
<th>Visual Fields</th>
<th>Preoperative Studies</th>
<th>Endocrine Studies</th>
<th>Pathology</th>
<th>Culture</th>
<th>Preoperative Diagnosis</th>
<th>Follow-Up Duration</th>
<th>Visual Fields</th>
<th>Required Endocrine Replacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>26, F</td>
<td>bitemporal hemianopia</td>
<td>WBC, 6200; PMN, 56%; CSF, normal</td>
<td>normal</td>
<td>no tumor or pituitary tissue inflammatory reaction</td>
<td>sterile</td>
<td>pituitary tumor</td>
<td>2 mos</td>
<td>full</td>
<td>Diapid spray</td>
</tr>
<tr>
<td>2</td>
<td>12, M</td>
<td>full</td>
<td>WBC, 7100; PMN, 57%; CSF, not done</td>
<td>normal</td>
<td>no tumor or pituitary tissue</td>
<td>alpha Streptococcus, Neisseria sp., Micrococcus, Staphylococcus epidermidis</td>
<td>craniopharyngioma</td>
<td>6 mos</td>
<td>full</td>
<td>none</td>
</tr>
<tr>
<td>3</td>
<td>69, M</td>
<td>rt eye: incomplete superior quadrantanopia; lt. eye: temporal hemianopia</td>
<td>WBC, 6800; PMN, 47%; CSF, not done</td>
<td>hypopituitary</td>
<td>chromophobe adenoma</td>
<td>sterile</td>
<td>pituitary tumor</td>
<td>4 yrs</td>
<td>—</td>
<td>dexamethasone Synthroid Delatestryl</td>
</tr>
<tr>
<td>4</td>
<td>31, M</td>
<td>bitemporal hemianopia</td>
<td>WBC, 7100; PMN, not done; CSF, not done</td>
<td>hypopituitary</td>
<td>no tumor or pituitary tissue inflammatory reaction</td>
<td>Citrobacter diversus</td>
<td>recurrent meningitis from CSF fistula</td>
<td>8 mos</td>
<td>full</td>
<td>Synthroid</td>
</tr>
<tr>
<td>5</td>
<td>12, M</td>
<td>bitemporal hemianopia</td>
<td>WBC, 6300; PMN, not done; CSF, normal</td>
<td>hypopituitary</td>
<td>no tumor or pituitary tissue inflammatory reaction</td>
<td>sterile</td>
<td>hemorrhage into craniopharyngioma</td>
<td>6½ yrs</td>
<td>rt eye, incomplete temporal hemianopia; lt eye, full</td>
<td>cortisone Synthroid posterior pituitary powder</td>
</tr>
<tr>
<td>6</td>
<td>16, F</td>
<td>normal</td>
<td>WBC, 7800; PMN, not done; CSF, elevated pressure &amp; protein leukocytosis</td>
<td>hypopituitary</td>
<td>pituitary fragments chronic inflammation</td>
<td>sterile</td>
<td>meningitis from erosion of pituitary tumor into sphenoid sinus</td>
<td>6 mos</td>
<td>—</td>
<td>hydrocortisone Diabinese Delalutin Demulen</td>
</tr>
<tr>
<td>7</td>
<td>67, M</td>
<td>—</td>
<td>WBC, 22,600; PMN, 63%; CSF, elevated pressure; leukocytosis</td>
<td>—</td>
<td>chromophobe adenoma</td>
<td>Diplococcus pneumoniae</td>
<td>pituitary abscess</td>
<td>—</td>
<td>full</td>
<td>—</td>
</tr>
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*WBC = white blood cells; PMN = polymorphonuclear cells; CSF = cerebrospinal fluid.
Pituitary abscesses

Case 2

This 12-year-old boy was admitted to UCSF on February 28, 1974. He had complained of headaches during the preceding 6 months. These were often accompanied by vomiting but never by visual symptoms. Growth had been normal. Except for a slightly stiff neck, physical and neurological examinations were normal. An enlarged sella was evident on plain skull films (Fig. 1 left). Tomograms demonstrated thinning of the dorsum sellae with an intact lamina dura and no intrasellar calcification (Fig. 1 right). Results of angiography and pneumoencephalography were normal.

On March 8, 1975, transsphenoidal drainage of a pituitary abscess was performed. After the bony wall of the sella was removed the dura was incised and a large collection of yellowish-white pus-like material exuded. The dura was opened wide and coagulated to maintain access, and the sella was emptied. Cultures of the sella contents grew alpha Streptococcus, Neisseria species, Micrococcus, and a few Staphylococcus epidermidis. Except for transient diabetes insipidus the patient made an uneventful recovery.

Case 3

This 69-year-old man was admitted to UCSF on December 12, 1968. He had had prolonged chronic sinusitis. For the preceding 6 months his vision was blurred, and he noticed a tendency to bump into objects on his left. An ophthalmologist had previously obtained skull x-ray films which revealed sellar enlargement. During the preceding 15 years he had noticed loss of libido and potency and recently had begun to lose axillary and pubic hair. For 20 years he had been receiving thyroid hormone. Carotid angiography showed that both carotid siphons were displaced laterally, and the horizontal portion of both anterior cerebral arteries was elevated.

On December 14, 1968, he underwent a left frontal craniotomy, and a pituitary abscess was drained. A mass elevating both optic nerves and chiasm was seen; but aspiration of the mass did not produce fluid. The capsule was incised and the tumor curetted. Purulent material, which largely filled the sellar mass, began to exude from it. Gram stain showed Gram-negative cocci but cultures of this material were sterile. Biopsy showed a chromophobe adenoma.
Postoperatively the patient was continually febrile with temperatures of 38° to 38.5° C. He was given systemic antibiotics until the 20th postoperative day. He was discharged 10 days later, and subsequently received 5300 rads to the pituitary area over 5 weeks. He did well, and his visual fields remained stable until he returned on November 30, 1972, because of pituitary apoplexy. Despite two transsphenoidal procedures to decompress the sellar hemorrhage, he died on December 15, 1972. Autopsy revealed hemorrhage and infarction of a residual chromophobe adenoma and an *E. Coli* meningitis with early abscess formation in the right parietal lobe.

**Case 4**

In 1959, this 31-year-old man was found to have Cushing's syndrome and was treated with bilateral adrenalectomies. In 1968, his symptoms recurred with hypertension and elevated adrenocorticotropic hormone (ACTH) levels. Treatment with orthopara-DDD (2, 2-bis (2-chlorophenyl, 4-chlorophenyl)-1, 1-dichloroethane) was unsuccessful, and in September, 1969, he underwent pituitary irradiation. In 1971, he was seen at UCSF with complaints of nausea, vomiting, and malaise. His ACTH levels were elevated and the sella was enlarged. Nelson's syndrome was diagnosed.

An intrasellar adenoma was removed via the transsphenoidal approach in November, 1971. Subsequently the patient required thyroid hormone therapy. In 1972 and on three occasions in 1974, he developed meningitis. On admission in November, 1974, the patient noted the onset of blurring in both lateral visual fields. On December 22, 1974, he was readmitted for craniotomy and excision of a Rathke's pouch cyst on March 12, 1968. Postoperatively he did well, and required only small quantities of cortisone, posterior pituitary powder, and thyroid hormone. He was readmitted on two occasions with recurrent nausea, vomiting, malaise, and "a tired feeling in the head." No cause was found. He returned on July 12, 1975, with similar symptoms and a 1-week history of 37.7° C temperature in the afternoon. On the fourth hospital day he complained of blurred vision; a bitemporal hemianopia and bilateral visual acuity of 20/400 were found. Air ventriculography revealed in the chiasmatic cistern a mass that elevated the third ventricle. A left frontal craniotomy was performed. Both optic nerves were stretched over a dome of tough reddish-brown tissue. A No. 20 spinal needle was inserted into the mass and about 3 cc of creamy pus-like material was evacuated. The cyst was irrigated with Bacitracin solution and a small amount of Bacitracin was left in the cyst. The patient did well until the 21st postoperative day, when he began to vomit again and his temperature rose to 38.5° C. The bitemporal hemianopia had extended bilaterally into the superior and inferior nasal quadrants. The sella was drained via the transsphenoidal approach. The patient did well, and by the second postoperative week the nasal field depression had improved.

**Case 5**

This 11-year-old boy underwent craniotomy and excision of a Rathke's pouch cyst on March 12, 1968. Postoperatively he did well, and required only small quantities of cortisone, posterior pituitary powder, and thyroid hormone. He was readmitted on two occasions with recurrent nausea, vomiting, malaise, and "a tired feeling in the head." No cause was found. He returned on July 12, 1975, with similar symptoms and a 1-week history of 37.7° C temperature in the afternoon. On the fourth hospital day he complained of blurred vision; a bitemporal hemianopia and bilateral visual acuity of 20/400 were found. Air ventriculography revealed in the chiasmatic cistern a mass that elevated the third ventricle. A left frontal craniotomy was performed. Both optic nerves were stretched over a dome of tough reddish-brown tissue. A No. 20 spinal needle was inserted into the mass and about 3 cc of creamy pus-like material was evacuated. The cyst was irrigated with Bacitracin solution and a small amount of Bacitracin was left in the cyst. The patient did well until the 21st postoperative day, when he began to vomit again and his temperature rose to 38.5° C. The bitemporal hemianopia had extended bilaterally into the superior and inferior nasal quadrants. The sella was drained via the transsphenoidal approach. The patient did well, and by the second postoperative week the nasal field depression had improved.

**Case 6**

This 16-year-old girl was well until December, 1974, when she ceased menstruating and at the same time began to have frequent headaches. From January 2 to January 12, 1975, she was treated for meningitis. Skull x-ray films revealed an enlarged sella. On March 27, 1975, she developed headache, fever, stiff neck, spinal pain, nausea, and vomiting, and noticed a profuse watery discharge from her nose when she leaned forward. The next day she was admitted to UCSF.

Meningitis was suspected, and she received parenteral penicillin and chloramphenicol treatment. Skull x-ray films and tomograms demonstrated an enlarged sella without bony defect.
On April 11, 1975, transsphenoidal drainage of a pituitary abscess was performed. The anterior sella wall was very thin. The dura was coagulated and aspirated, producing purulent material. After the dura was opened, only a thin rim of compressed pituitary gland was visible. Most of the sella was filled with the now emptied abscess capsule. The postoperative course was uncomplicated.

Case 7

This 67-year-old man was evaluated elsewhere because of a 3-month history of headache. Plain skull films showed an enlarged sella (Fig. 2). Seven days later he was found in an unresponsive state. He was taken to another hospital, semicomatose, with a temperature of 39.4°C, bilateral papilledema, and a stiff neck. On transfer to UCSF, he was deeply comatose and hyperthermic. Carotid angiography revealed an enlarged sella without evidence of a suprasellar mass. A diagnosis of pituitary abscess was followed by an emergency transsphenoidal hypophysectomy and drainage of a pituitary abscess. Frank pus filled the sella. Biopsy revealed a chromophobe adenoma. Postoperative visual field examination by confrontation was normal. He developed CSF rhinorrhea accompanied by multiple pulmonary emboli, and died on the 56th postoperative day of sepsis secondary to an intra-abdominal abscess.

Discussion

Of the 50 reported cases of pituitary abscess, 22 are adequately detailed for clinical analysis; we have added our seven patients, making a total of 29 cases for study.

Other than two cases initially suspected of subarachnoid hemorrhage, these patients have presented with clinical pictures of either pituitary tumor or meningitis. Seven of these and our Cases 4, 5, 6, and 7 presented with meningitis, or courses suggestive of meningitis, usually with fever and obtundation, with or without laboratory evidence of infection. Four of these had recurrent episodes of purulent or aseptic meningitis. In 12 reported cases and our Cases 1, 2 and 3 the preoperative or preautopsy diagnosis of pituitary tumor was based upon the finding of sellar enlargement accompanied by headache, visual disturbances, amenorrhea, decreased libido, polydipsia, and polyuria.

Before the antibiotic era, almost all pituitary abscesses were found at autopsy in patients who had died of generalized sepsis, but this association has now become rare. A clearly definable source of infection is often not apparent, both in the cases reported in the literature and in several of our cases, and therefore the apparent lack of a source of infection does not eliminate the possibility of pituitary abscess. The extension of contiguous infections from purulent sphenoid sinusitis, meningitis, or cavernous sinus thrombophlebitis have all been reported. In the cases of meningitis and cavernous sinus thrombophlebitis, it is not always clear whether the pituitary abscess was primary or secondary. Abscesses that develop after craniotomy or transsphenoidal hypophysectomy may often be secondary to operative contamination or CSF fistula. In four reported patients and our Cases 3 and 7 the abscess developed within a primary pituitary tumor or cyst; in two cases, abscesses developed within sellar cranio-pharyngiomas. Possibly tumors are vulnerable to infection because of impaired circulation, areas of necrosis, or local im-
TABLE 2

Mortality in 29 patients with pituitary abscess

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>No. of Cases</th>
<th>No. of Deaths</th>
<th>Mortality (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>abscess located within tumor</td>
<td>8</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>chronic history suggestive of pituitary tumor</td>
<td>15</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>meningitis</td>
<td>11</td>
<td>5</td>
<td>45</td>
</tr>
<tr>
<td>total reported cases</td>
<td>29</td>
<td>8</td>
<td>28</td>
</tr>
</tbody>
</table>

munological impairment. While such explanations remain speculative, pituitary abscess coexists with tumor too frequently to attribute to chance. This becomes important in the patient with a known or suspected pituitary tumor whose problem is not adequately explained by an uncomplicated pituitary tumor, for instance, the patient with a known pituitary tumor who develops meningitis.

Montrieul, et al., presented a case that has since been cited in reviews as one of pituitary abscess. However, they considered other possibilities and felt that their case and several others in the literature represented instances of aseptic necrosis of pituitary tumors. Cultures from their patient and from the cases they discussed were sterile and the reported pathology did not exclude the possibility of tumor. They noted that the macroscopic appearance of the sellar contents could be pus-like without being infectious in origin. Our Cases 1 and 5 resemble their cases. In 14 cases the sellar contents were sterile, but today we recognize that "sterile" cultures may often represent undetected anaerobic infections because available procedures are inadequate for bacteriological isolation. Assuming that these abscesses are bacteriologically similar to brain abscesses, up to 80% may contain anaerobic organisms. The range of causative organisms reported is diverse; specific microbes are discussed elsewhere.

Sixteen of the 29 cases had visual impairment consistent with optic chiasmal involvement; no visual fields were described in four cases. Of the 11 patients with meningitis, five had temporal or bitemporal hemianopias. Only one patient had normal visual fields; fields were not discussed in four cases. Case 4 in our series developed a transient left paracentral scotoma with progression to a bitemporal hemianopia. A chiasmal field defect occurring in a patient who appears to have meningitis suggests the presence of a pituitary abscess.

Of the 29 cases, only three had normal sellae on plain skull films. Of 11 cases presenting with meningitis, only one had a normal sella on x-ray study, seven had enlarged or eroded sellae, and three died before x-ray films could be taken. Meningitis in a patient discovered to have an enlarged or eroded sella, or in a patient known to harbor a pituitary tumor, is a clinical situation in which the preoperative diagnosis of pituitary abscess should be made. While the number of cases available for analysis is small, the association of pituitary abscess with x-ray evidence of sellar pathology is consistent. If an enlarged sella is ascribed to pathology other than the meningeal infection, the clinician has thus postulated two distinct disease processes in a given patient and has disregarded the possibility of secondary infection in a pre-existing tumor. Reasoning that the meningitis and eroded sella were related enabled us to make the correct preoperative diagnosis in Case 7, the only reported case of pituitary abscess that has been diagnosed preoperatively. Had we reasoned similarly in Case 6, we would also have diagnosed this case preoperatively. To our knowledge, less than half of the patients with pituitary abscess present with meningitis. However, the diagnosis must not be overlooked since patients with meningitis and a sellar abscess have the highest mortality of all patients with pituitary abscess. The disease itself has an overall mortality rate of 28%, whereas those who develop meningitis have a 45% mortality rate (Table 2). The CSF findings and clinical presentation may be exactly the same in a ruptured craniopharyngioma cyst, except that the CSF will be sterile and a Gram stain will not contain bacteria. In patients who have previously received antibiotics, as did our Case 4, these two diseases may be impossible to differentiate.

In each of the four patients who underwent transsphenoidal abscess drainage (Cases 2, 5, 6, 7), the intracranial infection was subsequently well controlled. However, in Case 4 a frontal lobe abscess developed after craniotomy, and in Case 5 a transphenoidal
procedure was necessary 3 weeks after craniotomy to drain a recurrent abscess. In Case 7 the patient died 56 days after a transsphenoidal operation of causes unrelated to his surgery.

Several lessons emerge from this retrospective analysis. First, skull films should be obtained when meningitis is suspected or established. Second, regardless of CSF bacteriology, if the sella turcica is abnormal, the correct presumptive diagnosis is pituitary abscess. Third, prompt improvement should follow appropriate antibiotic and corticosteroid therapy; if the patient fails to improve, the suspected abscess should be explored and drained. Should a craniopharyngioma that has ruptured into the subarachnoid space be encountered, transsphenoidal drainage constitutes appropriate therapy. We believe that the preferred surgical approach is transsphenoidal, since it provides open drainage without further contaminating the CSF, and because the morbidity of this operation is far less than that for craniotomy in an ill patient.

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